



# Trans-Lake Washington Project

Washington State  
Department of Transportation  
Sound Transit

## TECHNICAL MEMORANDUM

Date: **May 12, 2002**  
To: **Trans-Lake Washington Team**  
From: **Michael Minor**  
Subject: **Preliminary Noise Analysis for Eastlake/Roanoke/Cahill/Montlake**  
cc:

Preliminary noise level calculations were performed for the western section of the Trans-Lake Washington Project, from the I-5 – SR-520 interchange to Lake Washington. Fourteen representative receiver locations were used in the analysis. Noise levels were projected for the existing conditions, future build under the 8-lane alternative with proposed design options, and future build 8-lane with noise mitigation. The following assumptions were used for the analysis:

1. Under all noise calculations, only traffic on I-5, SR-520 and SR-520 on- and off-ramps were used in the model. No local arterial or collector roads were used in the model.
2. **Existing Conditions Calculations:** The existing roadway alignment and traffic volumes were used in the noise model. Travel speeds are 55 mph on the I-5 and SR-520 mainlines and express lanes and 35 mph on the access ramps. The results of the existing conditions modeling agree, at most receivers, with recent measured data. Any discrepancies are likely due to the exclusion of the local area traffic in the analysis along with topographical conditions.
3. **Future Conditions Calculations:**
  - Under the future conditions two different lid options were examined. Under Lid 1 option, E Roanoke and 10<sup>th</sup> Avenue would be lidded, and Delmar Dr E would be converted to an expanded overpass. Under Lid 2 Option, a lid would be placed between 10<sup>th</sup> Avenue and Delmar Dr E and a second lid would be placed over I-5 along E Roanoke. Under both options, a lid approximately 500 feet long would be used for the Montlake crossing. The approximate location of the lids and expanded overpasses are provided on the graphics.
  - Noise levels were projected for the peak-hour  $L_{eq}$  and 24-hour  $L_{dn}$  at each of 14 receiver locations. Receiver heights of 5 and 15 feet were modeled at each location. Receiver locations are shown on the attached figures.

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- Noise walls were used to mitigate noise impacts identified based on the future conditions traffic volumes and highway configurations. Standard concrete noise barriers were used where possible. Mitigation for noise structures and bridges assumed absorptive barriers.
- Traffic assumptions included using the maximum hourly traffic volumes for the year 2020 under the 8-lane build alternative. Speeds used for the analysis included 55 mph on all associated roadways and 35 mph on the access ramps between I-5 and SR-520. An additional run for the build condition without mitigation was performed at 35 mph for comparison.

The attached tables contain the peak-hour  $L_{eq}$  and 24-hour  $L_{dn}$  for each of the modeled conditions, along with a comparison of future and existing conditions noise levels. There are two tables for Lid Option 1, and two for Lid Option 2. A summary of the noise results are given below.

#### Lid Option 1:

- **$L_{eq}$  Noise Levels:** Noise levels are reduced to below the requested 66 dBA  $L_{eq}$  at all 5 foot receiver locations. There are six 15 foot locations that equal, or exceed the 66 dBA  $L_{eq}$  with levels ranging from 66.0 to 67.6 dBA. Averaged future noise levels are below the existing noise level at the majority of 5 and 15 foot locations. Noise level reductions of up to 17 dBA are possible at some locations under this modeling scenario.
- **$L_{dn}$  Noise Levels:** Noise levels are reduced to below the requested 65 dBA  $L_{dn}$  at all 5 foot receiver locations. There are six 15 foot locations that equal, or exceed the 65 dBA  $L_{dn}$  with levels ranging from 65.4 to 67.0 dBA. Averaged future noise levels are below the existing noise level at the majority of 5 and 15 foot locations.

#### Lid Option 2:

- **$L_{eq}$  Noise Levels:** Noise levels are reduced to below the requested 66 dBA  $L_{eq}$  at all 5 foot receiver locations. There are five 15 foot locations that equal, or exceed the 66 dBA  $L_{eq}$  with levels ranging from 66.0 to 67.6 dBA. Averaged future noise levels are below the existing noise level at the majority of 5 and 15 foot locations. Noise level reductions of up to 17 dBA are possible at some locations under this modeling scenario.
- **$L_{dn}$  Noise Levels:** Noise levels are reduced to below the requested 65 dBA  $L_{dn}$  at all 5 foot receiver locations. There are five 15 foot locations that equal, or exceed the 65 dBA  $L_{dn}$  with levels ranging from 65.4 to 67.0 dBA. Averaged future noise levels are below the existing noise level at the majority of 5 and 15 foot locations.

#### General Summary:

The modeling shows that it is possible to construct SR-520 in the 8-lane configuration through the I-5 to Montlake area and maintain noise level with in criteria set for the project. There are still some discrepancies on noise reduction from the floating structure through the Madison Park



area which will be solved with additional noise modeling and analysis during the current ongoing design phases.

There is little difference between the two lid options. The slight increase in possible noise level reduction with Lid 2 at some receivers could likely be achieved with slightly higher noise walls in select areas.

Finally, because this is a preliminary noise analysis, no noise wall optimization was performed. The fixed wall height of 14 feet for at-grade locations (16 feet along Boylston) and 8 foot absorptive walls on the structures will be optimized during the design process to obtain maximize noise reduction with minimal height. In addition, research into optional surface treatment to minimize wall reflections will also be performed.

